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MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2022/2023 (TERM ID 2230)

JPBM0054 – MATHEMATICS
(Bridging Course)

04 OCTOBER 2023
9.00 a.m. – 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of 2 pages with **FOUR** questions.
2. Attempt **ALL** four questions. The distribution of the marks for each question is given.
3. Please write all your answers in the answer booklet provided. All necessary workings **MUST** be shown.

QUESTION 1

- a. Express the following as a single logarithm and simplify the expression.

$$\log (5x)^2 + \log (x^2 - 4) - \log 15x^{\frac{1}{2}} - \log (x + 2) \quad (4 \text{ marks})$$

- b. Solve the following equations.

i. $\ln(2x + 7) = \ln 3 - \ln (x + 1)$ (7 marks)

ii. $\frac{1}{5}(2^{x^2} - 20) = -\frac{3}{4}$ (7 marks)

- c. Solve the following equation by using appropriate substitution.

$$m^{\frac{2}{3}} - 2m^{\frac{1}{3}} - 8 = 0 \quad (7 \text{ marks})$$

(Total: 25 marks)

QUESTION 2

a. Solve $\begin{bmatrix} 6 & 9 \\ -3 & 10 \end{bmatrix} \begin{bmatrix} -1 & 8 & 11 \\ 2 & 5 & -7 \end{bmatrix} - 4 \begin{bmatrix} 1 & -6 \\ 4 & 8 \\ -2 & 12 \end{bmatrix}^T$ (5 marks)

- b. Given

$$\begin{bmatrix} -6+p & 2 & q+3 \\ -2-r & 11 & 2s \end{bmatrix} + \begin{bmatrix} 3-2p & 5q+3 & 7 \\ 4p & 0 & 8-q \end{bmatrix} = \begin{bmatrix} 5 & t & 6q-5 \\ 2r & 11 & -35 \end{bmatrix}.$$

Find the values of p, q, r, s and t . (7 marks)

- c. Solve the following system of linear equations using the inverse of coefficient matrix.

$$\begin{aligned} x + y + z &= 14 \\ x - 2y &= -3 \\ x + 2y + 5z &= 27 \end{aligned} \quad (13 \text{ marks})$$

(Total: 25 marks)

Continued...

QUESTION 3

a. Find y' for the given functions and simplify the answers.

i. $y = -\frac{3}{\sqrt[5]{x^3}} + \frac{1}{15}x^{-10} - 9x^{-\frac{2}{3}} + \frac{1}{2}\sqrt{x}$ (5 marks)

ii. $y = (1 - 3x)^3(1 + 2x)^4$ (6 marks)

iii. $y = \frac{(x^2 + 2)^2}{(1 - 5x)^3}$ (6 marks)

b. Find an equation of the tangent line to the curve

$$f(x) = \sqrt{x} + \frac{5}{\sqrt{x}}$$

at the point $x = 4$. (8 marks)

(Total: 25 marks)

QUESTION 4

a. Find the following integrals.

i. $\int -x^{-3} \left(4x^{\frac{2}{3}} - \frac{10}{x^{\frac{5}{7}}} + \frac{1}{x^6} - 8 \right) dx$ (6 marks)

ii. $\int \frac{(3 - x^{-3})(9x^2 - 5)}{2x^4} dx$ (6 marks)

b. Evaluate the following integrals using substitution techniques.

i. $\int 12x \sqrt[5]{4 - 3x^2} dx$ (5 marks)

ii. $\int_1^2 \frac{7x^2 - 2}{(7x^3 - 6x)^3} dx$ (8 marks)

(Total: 25 marks)

End of Paper